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Exploring the perceived health benefits of singing in a choir: an international cross-sectional mixed-methods study

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Abstract

Aim: This mixed-methods exploratory study investigates the perceived health benefits of singing in a choir from an international sample of choristers.

Method: An online questionnaire including demographic information, 28 quantitative statements and two qualitative questions relating to the perceived health benefits of singing in a choir was distributed via email and social media over a period of 4 months to a sample of 1,779 choristers. Basic descriptives and comparisons between subgroups of the sample are presented along with thematic analysis of qualitative comments.

Results: Basic descriptives suggest an overwhelmingly positive response. Females scored significantly higher than males on physical benefits, social benefits and emotional benefits. Professional singers reported significantly more physical, social and spiritual benefits than amateur singers. Bias may be present in these findings as the results were entirely self-reported by people who already sing in choirs. Qualitative thematic analysis identified six key themes which may counter this bias by providing deeper understanding of the perceived benefits for choir singers. These include social connection, physical and physiological benefits (specifically respiratory health), cognitive stimulation, mental health, enjoyment and transcendence.

Conclusion: Choral singing elicits a positive response in the chorister across a plethora of domains. This research confirms previous findings on the health benefits of singing but offers evidence from the largest sample of singers to date. However, results are based on self-perceptions of choristers, and findings are, therefore, limited. Results may be used as a base on which to develop further research in this area. It also provides confirmatory evidence to support choral singing as a means of improving wellbeing in many populations, including but not limited to workplaces, schools, nursing homes, communities and churches.

BACKGROUND

Research regarding the potential health benefits of singing is well developed, with a large body of work to support singing as a health and wellbeing intervention. Studies investigating the benefits of singing include, in particular, evidence of the positive impact of singing on dementia,^{1–5} chronic obstructive pulmonary and respiratory disease^{6–10} and cancer.^{11–15}

Singing and music making is indicated as a protective factor for cognitive decline.¹⁶ Making

music at least once every 2 weeks and especially playing a musical instrument is associated with better attention, episodic memory and executive functions. However, future longitudinal studies are needed in this area.¹⁶ A review of literature on singing and respiratory health reported trends of positive physical and/or quality-of-life outcomes after a series of singing lessons. Several studies noted improvements in maximum expiratory pressure and overall breathing technique. Many studies included open-ended interviews revealing

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participants' perception of singing as an effective therapy that was fun, improved mood, taught breathing and breath control, was a good exercise for the lungs and had improved physical functioning.⁶⁻⁸

Notable recent research also indicates significant benefits of singing lullabies to prenatal and newly born babies, in particular positively affecting parent–infant bonding and incidence of post-natal depression.^{17,18} Overall, qualitative data across studies indicates that singing is an enjoyable experience for health-care patients, who consistently report that it helps them to cope with their condition better. Larger and long-term trials are recommended by most studies.

The wellbeing benefit of singing in workplace and community choirs has also been explored.^{8,19,20} A number of in-depth reports have been produced in recent years regarding singing and health – notably the Workplace Choir of the Year report, United Kingdom:²¹ a major report on choral singing, wellbeing and health²² as well as a systematic mapping and review of non-clinical research on singing.²³ Staff choirs are recommended in several countries for workplace wellbeing and as a health promotion and social inclusion initiative.^{24,25}

Significant literature exists on the benefits of singing on mood and mental health, especially in dementia, with community-based singing groups particularly recommended as part of psychosocial rehabilitation and mood improvement tool for people with mood disorders²⁶⁻²⁸ and in older age.²⁹ Singing groups for people with dementia have been associated with significant increases in satisfaction with life and cognitive improvement.³⁰ There was a reduction in agitation in people with dementia who attended a music therapy group for 6 weeks but not lasting reduction was noted.³¹

Nonetheless, two Cochrane reviews and a systematic survey of singing and health in 2010 conclude that further research is warranted to empirically determine the health effects of singing.^{9,10} Current studies have relatively small sample sizes and are highly variable in terms of the participant involved (disadvantaged groups, clinical

populations and professional singers) and the outcome being investigated (e.g. physical health, mental health or specific illnesses).^{9,10,22,32,33}

Perceptions of singers themselves have been explored in a few studies, most notably an international study of 1,000 choristers and their perceptions of psychological wellbeing.^{20,19,34} The largest study identified to date is by Clift *et al.* who administered a large-scale, cross-national survey to assess choral singers' perceptions of the effects of singing in Australia, Germany and England. This sample consisted of 591 choral singers with an average age of 61 years. The results from this study confirm previous findings that a large majority of choir participants perceive the experience of singing to be a beneficial one. An interesting finding from this survey was that perceptions are gendered, with females significantly more likely to report benefits compared with males.²² A number of studies have explored the self-perception of health service users of singing in a choir. For example, Hopper *et al.* explored service user perceptions of a community pain choir. Themes arising from this study included physical improvements, emotional impact, personal growth, interpersonal processes, relationship with the 'self', living well with pain and sharing the music. Only seven participants were interviewed for this study.³⁵ A study of people with dementia and their family carers attending a choir indicated that they perceived benefits in social inclusiveness, mood and improved relationships, as well as self-reported improvements in accepting and coping with the diagnosis of dementia.³⁶ Similarly, a qualitative study of the perceptions of 11 people with Parkinson's disease of group singing showed similar positive effects and themes.³⁷

Participants in amateur choirs for people with cancer experienced the choirs as both an uplifting musical activity and a supportive community group.¹⁴ Another study involved interviews with choir singers from a range of social backgrounds in Canada, including a small choir for homeless men. This study revealed that group singing alleviated

depression and that the choir provided a supportive environment for its participants.^{38,39}

However, few studies exist to date that provide a general overview of self-perceptions of various health domains in one study (including psychological, social, cognitive and physical in one study) as well as exploring qualitative perceptions on a large scale.

Previous studies recommend two routes for potential future research – large-scale empirical studies and those which provide conceptual clarity regarding the field of singing and health. Conceptual clarification refers to the nature of singing itself and an understanding of which approaches might be most useful (i.e. choral singing, singing solo, singing lessons or therapeutic interventions) as well as a clear definition of health and/or wellbeing.

The aim of this study was to assess the perceived health benefits of choral singing in a large sample of singers. The aims of the study were as follows:

- To explore the perceptions of wellbeing and health of singers engaged in choral singing from both quantitative and qualitative perspectives.
- To overcome previously cited limitations of small sample size and research of specific clinical populations by conducting a large-scale quantitative study with a broader demographic and heterogeneous sample.
- To address conceptual clarification recommendations, the survey also contained two qualitative questions to enable a large-scale thematic analysis to be undertaken. This aimed to explore the nuances of singing in choirs and to expand understanding of the health and wellbeing benefits experienced by participants.
- To conduct the first ever survey of the health benefits of singing in the Republic of Ireland.

This study is important as it is the largest sample to date of the perceptions of the health benefits of choral singing and it is a mixed-methods study,

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collecting both quantitative and qualitative data. The quantitative data are limited in that only people who already attend a choir completed the survey, so the results may be skewed in favour of singing. However, the qualitative results provide a large body of thematic evidence of the health and wellbeing benefits of singing, as well as elaborating on the benefits cited in the quantitative study.

METHODOLOGY

Design

This study employs a mixed-methods design, utilising a self-report questionnaire to collect both quantitative and qualitative responses in an attempt to identify various domains in which choristers believe choral singing can impact their wellbeing. Survey was distributed in both soft copy and hard copy formats.

Participants

Analysis is based on 1,779 choristers (1,460 females (82.1%), 306 males (17.2%) and 13 missing (0.7%)). Breakdown of participant age range is as follows: 18–29 (267; 15%), 30–39 (266; 15%), 40–49 (369; 20.7%), 50–59 (420; 23.6%), 60–69 (334; 18.8%), 70–79 (109; 6.1%) and 80 or older (6; 0.3%). Remaining 0.4% were missing data. Participation in the study was completely voluntary, with no monetary reward or incentive offered to participants. This sample represents an international chorister community, with participants from Ireland, Australia, United Kingdom, United States, Spain, Bosnia and Herzegovina, Canada, New Zealand, Croatia, France, Qatar, Denmark, Germany, Netherlands, Serbia, Singapore, South Africa, Finland and Sweden (breakdown available in Appendix 1). Participants identified as predominantly amateur choristers (1,583; 89%) with professional choristers making up a further 10.5% (187 participants) of the sample (remaining 0.5% of data were missing; 9 participants). The choral experience of this sample appeared to be relatively evenly distributed, with 26.1% (464) having sung in a choir all of their adult life, 24.6% (437) having sung in a choir most of their adult life, 36.1%

(643) having sung in a choir in the last 10 years, 9.6% (171) singing with a choir the last year and the remaining 3.2% (57) singing only in the last 3 months (0.4% missing).

Quantitative methodology

Demographics

Gender, nationality and age range of participants were gathered. Participants were also asked to report on their choral experience and their perceived choral singing competency (i.e. amateur or professional).

Benefits of singing in a choir questionnaire

A novel questionnaire was developed and distributed by the first author, guided by the work of Clift and Hancox¹⁹ and Clift *et al.*²⁰ This survey was piloted with 10 choristers, qualitative feedback was assimilated by the researcher and revisions were made. The final questionnaire comprised of 28 statements that were categorised under four headings of physical, social, emotional and spiritual (see Supplementary Appendix B for breakdown). Participants were asked to choose whether they *strongly disagree*, *disagree*, *agree* or *strongly agree* with each statement. For the purposes of data analysis, these four answers correlated with a score of 1, 2, 3 and 4, respectively. A handful of negatively worded statements were included in this questionnaire to combat response sets in the respondents. See Supplementary Appendix C for sample survey with all statements used.

Qualitative methodology

In total, two supplementary questions included in the survey allowed participants to give comments on how they perceived singing to benefit their health and wellbeing; 'Are there ways in which you think participating in the choir is "good for your health" – if yes please describe' and 'Please add any comments about the benefits of being in a choir'. These comments were collated and analysed using Braun and Clarke's⁴⁰ thematic analysis method (see Supplementary Appendix D).

To validate the thematic analysis process, the three researchers all coded a sample of the same 50 qualitative comments and met to discuss and review findings. These were the first 50 comments of over 2,000 collated from the survey data. These were selected as a sample of the full qualitative data as per best practice guidelines for validity processes in qualitative research.⁴¹ Inter-rater reliability was high, with the majority of themes being identified by all three researchers working independently and with variations on similar themes being labelled for other areas of analysis. When the three researchers reviewed their findings, the same themes had been identified, although different terms were used to describe similar themes (e.g. one researcher coded some themes as 'spiritual benefits', while another used the term 'transcendence'. All themes were kept at this stage to form nine themes for further analysis and then as the data analysis progressed, agreement was reached regarding the final themes. The process of thematic analysis is included in Supplementary Appendix D.⁴⁰

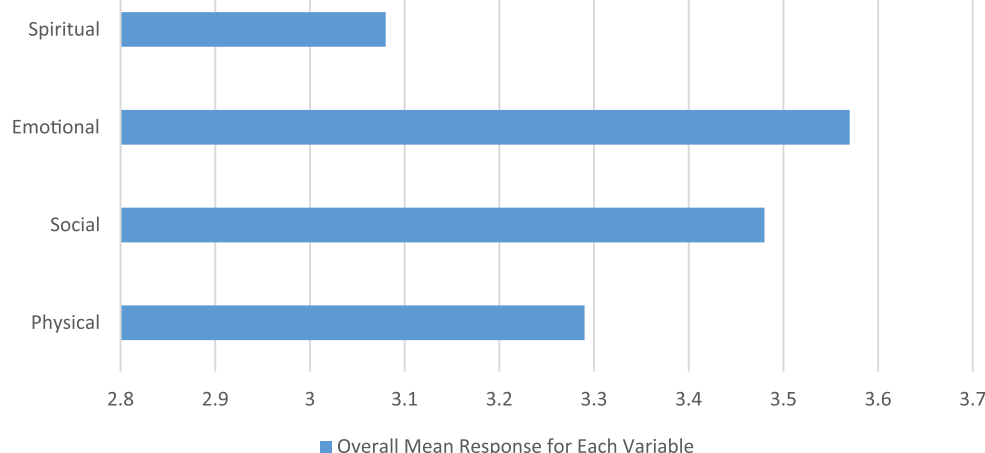
Procedure

Ethical approval was sought and obtained. The soft copy of the survey was distributed primarily via a Survey Monkey link in an email invitation to choirs registered with the Association of Irish Choirs (Cumann NáisiúntanagCór). **[AQ: 1]** This link was also posted on social media (i.e. Twitter and Facebook) and emailed to an extensive list of national and international colleagues in Arts and Health networks. Hard copies of the survey were posted when singers contacted the research office to request same. Approximately 50 of the 1,779 surveys were completed on hard copy. These were then transcribed by the research team onto Survey Monkey. The survey was left open for 4 months until the response rate plateaued. The survey was exported from Survey Monkey to an excel sheet, where it was transferred onto SPSS (Statistical Packages for the Social Sciences) software. Basic descriptives were derived from the data, and non-parametric Mann–Whitney *U* tests were used to compare subgroups

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Figure 1.

Overall mean response for each variable [AQ: 6]



such as male and female, amateur and professional.

RESULTS

Quantitative results

In total, 28 statements that comprised the questionnaire were categorised into four separate headings: physical benefits, social benefits, emotional benefits and spiritual benefits. These headings were determined subjectively by the first author based on a review of similar work in the literature.^{19,20} Ideally, a factor analysis would have aided the researchers in uncovering the underlying structure of the 28 items; however, this would not have been appropriate given that the Likert scale only presented four stages and thus violated an assumption of principal components analysis. The subjectivity bias in this process is acknowledged in the limitations of the research.

Descriptives

The mean score of the items that were categorised into physical, social, emotional and spiritual benefits were calculated to generate basic descriptives on the sample response. It must be noted that the mean scores are relative to the scope of the Likert scale utilised (*strongly disagree* = 1, *disagree* = 2, *agree* = 3 and *strongly agree* = 4). The overall mean score for items that were

categorised into the physical factor was 3.29 (standard deviation (*SD*) = 0.458), into the social factor was 3.48 (*SD* = 0.439), into the emotional factor was 3.57 (*SD* = 0.404) and into the spiritual factor was 3.08 (*SD* = 0.763). These scores are presented graphically in Figure 1.

The descriptive statistics for each of the 28 statements is presented in Supplementary Appendix E. A new variable was computed for each heading (mean score of items in each category: physical, social, emotional and spiritual) to compare any differences between subgroups of the sample. Researchers wished to identify any potential differences between male and female responses and amateur and professional singers. The data were not normally distributed; therefore, the non-parametric Mann–Whitney *U* test was considered to be the most appropriate statistical analysis. Depending on the shape and similarity of the distributions of each group, the medians or the mean ranks were compared to determine statistical significance.

Difference in responses across gender

Distributions of the physical benefits variable for males and females were not similar, as determined by visual inspection. Reports of physical benefits

of singing in a choir were statistically significantly higher for female participants (mean rank = 900.83) than for males (mean rank = 800.80), $U = 198,074.00$, $z = -3.131$, $p = .002$. Similar findings were documented for social benefits, with significantly higher reports of social benefits among females (mean rank = 899.24) than males (mean rank = 808.42), $U = 200,405.50$, $z = -2.855$, $p = .004$. Distributions of the emotional benefits and spiritual benefits variables for males and females were similar, as determined by visual inspection; thus, the medians rather than mean rank were compared to determine statistical significance. Reports of emotional benefits of singing in a choir were significantly higher for female participants (median = 3.70) than for males (median = 3.54), $U = 177,232.00$, $z = -5.723$, $p = .000$. Finally, there was no statistically significant difference in the reporting of spiritual benefits between males (median = 3) and females (median = 3), $U = 214,754.00$, $z = -0.782$, $p = .434$.

Differences in responses across competency

Distributions of all four variables (physical, social, emotional and spiritual) for amateurs and professionals were *not* similar, as determined by visual inspection; thus, mean ranks were

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compared. Reports of physical benefits of singing in a choir were statistically significantly higher for professional choristers (mean rank = 1,023.07) than for amateur choristers (mean rank = 869.25), $U = 173,736.50$, $z = 3.906$, $p = .000$. Similarly, social benefits of singing in a choir were reported significantly higher for professional choristers (mean rank = 1,009.64) than for amateur choristers (mean rank = 870.84), $U = 171,224.50$, $z = 3.539$, $p = .000$. No significant difference was observed between professional choristers (mean rank = 919.46) and amateur choristers (mean rank = 881.49) in reporting of emotional benefits, $U = 154,360.50$, $z = 0.966$, $p = .334$. Finally, reports of spiritual benefits of singing in a choir were statistically significantly higher for professional choristers (mean rank = 1,024.57) than for amateur choristers (mean rank = 863.94), $U = 174,016.50$, $z = 4.210$, $p = .000$.

Qualitative results

The process of transcribing, coding and analysing 2,359 qualitative comments resulted in initially 14 themes which were then collated and grouped into 6 themes. These are presented with a brief description and key quotations from the data to illuminate each theme.

Social connection

Social connection presented as a predominant theme, with participants identifying choir singing as an opportunity to increase their socialisation and develop their social skills. Regular rehearsal was considered to be an important social activity and outlet, with importance placed on social interaction, social connection, bonding and social inclusion. For the majority of participants attending a choir gave them a reason to go out or to mix with a more diverse range of people (age groups, gender and race) in their local community than normally available. Travelling with the choir and working for performances was identified as a strong group bonding experience, with choir members becoming like a second family to some participants:

For me, the primary benefit is that it helps me be connected with other choir members and members of the church congregation.

Choir is a social 'equaliser'. Singing together connects people ... you can achieve a high when accomplishing things as a team ... My choir has been my extended family for almost 30 years now. It's really uplifting when we sing together and really enhances my life generally.

For me, the primary benefit is that it helps me be connected with other choir members and members of the church congregation.

Improvements in physical and physiological health: respiratory health improvements

Myriad physical and physiological benefits were mentioned throughout the data, including but not limited to improvements in blood pressure; posture; reductions in physical pain and muscle tension; and, in particular, improvements in respiratory health such as awareness and control of the breath, lung capacity, alleviated symptoms of breathing disorders such as asthma and general strengthening of the lungs:

Lung capacity and breathing – my asthma control has improved ... (Singing is) excellent breathing control and lung development.

I have issues with blood pressure and consistently the BP monitor shows a reduction in my reading after performing/practice!

Cognitive stimulation

Subthemes: achievement, learning and self-esteem. Cognitive stimulation was noted in terms of keeping the brain active, learning a new skill, being challenged mentally and technically and improving concentration and memory. The achievement of learning a new skill was significant in the data. Participants report pride in themselves and in their community, increased confidence and a feeling of self-satisfaction. Thus, singing

was reported as improving self-confidence and self-esteem, increasing competence and becoming comfortable and confident. Learning new things was noted as a significant part of being in a choir, specifically learning from the conductor, learning to listen to people, learning to work effectively and respectfully with other people, learning new songs, learning about my body's capabilities, learning lyrics and learning about different musical genre:

A good choir can also help towards improving community morale/pride ... (There is) great pride when we see a happy audience ... I am immensely proud of my choir family and all that we achieve together.

It feels good to use your brain differently when reading music.

I used to think my voice was below average ... I have learned to sing out loud and proud.

It keeps my mind alert with all the learning we have to do in the music and the foreign languages we learn to use.

... gives people a sense of achievement, pride in themselves and in their community.

learning words helps with memory.

Enjoyment

Having fun was a major theme in the data and cannot be underestimated. The findings here overlap with mental health benefits reported by participants. However, this theme is significant in itself as participants repeatedly reported wellbeing benefits such as singing in a choir making them 'feel happier' 'makes you smile' and 'lifts mood'. The fun, enjoyment and light-hearted atmosphere of choir singing was named repeatedly, in terms of enjoying beautiful music, enjoying dressing up with friends to perform, having fun after a show, enjoying meeting other people, enjoying the company without having to talk all the time and enjoying the stimulations and achievements of the choir:

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Good fun and a complete switch off from life!

Mental health

This theme relates to specific psychological improvement, clinical phrases in the data that referred to singing acting as an alleviator of low mood or anxiety. There was ample data from participants to indicate benefit in this area. Participants named mental health improvements, strengthening or boosting mental health when needed and for others singing contributed to maintain good mental health:

I have to sing – for my mental health – I'd just die without music!

It has significantly improved my mental health, giving me more confidence and less anxiety.

Transcendence

Questions were included to see whether singing was perceived as having any relationship to spiritual health of participants. Scores for these questions were consistently high, and thematic analysis confirmed that participants found that singing can be spiritually uplifting, life affirming and a sense of connection at heart or energy level. It is important to note that no definition of spirituality was given. A meditative or mindful benefit was named consistently – for example, taking your mind away from things that worry you, while at choir, the mind rests from worries and concerns, bringing you into the present moment, focusing on breathing, leaving worries at the door. The activity of being creative, expressing deep aesthetic and creative urges as well as creating something of beauty with other people were noted as important features of choir singing.

A large section of data focused on stress reduction as the key benefit of singing in a choir – for example, decreasing or counteracting the stress of daily life, being a stress-free zone, releasing tension:

Great way to unwind and forget your stresses ... you can't stress about everyday worries when you are singing.

Singing requires complete concentration – it's a form of mindfulness.

When I'm singing I'm present in the moment ... it's almost like meditating.

(Choir singing) encourages your soul (to) feel part of something bigger than yourself ... being part of a group making a beautiful sound is very creative and instantly rewarding.

DISCUSSION

Responses across the four primary categories of physical, social, emotional and spiritual benefits were interpreted as overwhelmingly positive, with the mean response rate for each variable falling somewhere between *agree* (3) and *strongly agree* (4). The comparison between male and female responses revealed that female participants reported significantly higher scores for physical benefits, social benefits and emotional benefits than their male counterparts. There was no gender difference in responses retrieved for the spiritual benefits accrued from choral singing. The comparison between amateur choristers and professional choristers revealed that professional choristers reported significantly higher scores for physical, social and spiritual benefits than amateur singers, with no statistically significant difference in response between these subgroups for emotional benefits.

These basic descriptives across such a large international sample clearly outline the perceived benefits of singing in a choir and provide an informative grounding for future research in this area. The results offer some interesting insights into the possible differences in perception between subgroups and appear to echo earlier research on gender differences, with women reporting health and wellbeing benefits more highly than males across all domains. This difference, however, was only statistically significant for physical, social and emotional benefits. It has been widely speculated as to why women might report wider wellbeing effects than men (Ashley, 2002; Sandgren, 2009) and

indeed more informally, why the ratio of male to female in a choir is often greatly imbalanced. [AQ: 2] Personality research has purported that different social roles may play a key role in expression of emotion, with women being emotionally expressive and emotionally unstable and men being inexpressive and emotionally stable (Brody and Hall, 2008). [AQ: 3] These findings further highlight the need to disentangle this gender difference that is largely evident not only in a choral setting but across many leisure activities.

This is an international study, but the sample responding from Ireland was proportionally high relative to other nationalities. This study offers the largest study of Irish singers as well as having international reach.

This research also examined differences between professional and amateur singers in perceived benefits of singing in a choir. It was predicted that professional singers might cite physical/physiological benefits more highly than amateur singers, due to extended training of vocal and breathing techniques. Similarly, it was expected that amateur singers may report social and emotional benefits more highly than professionals as amateur/community choirs often sing as a leisure activity or a social gathering. Nonetheless, professional choristers scored higher across all domains than their amateur counterparts, with the difference being statistically significant within the physical, social and spiritual categories. The authors would like to acknowledge two limitations in the interpretation of this finding; first, a wide variation in understanding of 'spiritual benefits' among respondents is likely. Second, no clear definition of 'professional singer' versus 'amateur singer' was provided, thus opening that demographic question to a scope of interpretations. Nonetheless, these findings suggest an interesting contrast between the responses of these two populations which could be more thoroughly examined in future research.

Social bonding has arisen as a key benefit in many previous studies, but important to note is that while self-reporting singers indicate benefits in

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physical and mental health and satisfaction with life, an important factor in these health improvements may be feeling part of a group rather than the specific activity of singing.⁴² Nonetheless, this study confirms the potential importance of social activities for people in terms of improving mental health and self-perception of health and wellbeing, and future studies might explore the specific aspects of choral singing that might contribute to these health improvements.

This study also confirms previous research which indicates the major benefits of choral singing as social and emotional.¹⁹ Further research may explore whether these are the most important benefits over physical or psychological. While previous studies have explored this area of spiritual health and singing, research in this area is relatively scarce, and studies have had smaller samples.^{22,23,43,44} This study contributes originality by including spiritual health as a key domain of enquiry and by the emergence of a major theme of transcendence from such a large sample of qualitative data. Statistical evidence of participation in cultural events having a positive effect on health and survival rates^{45,46} as well as recent significant research on the effect of singing on the health of people with cancer^{13,14} indicate evidence that singing improves mood state and modules components of the immune system. This study provides further evidence with a large sample that indicates that further research on singing is warranted.

While there was little data on negative experiences of singing in a choir, and the vast majority of the qualitative data noted positive health and wellbeing benefits associated with singing in a choir, it is important to note the few negative comments as they inform the experience being studied. A few participants noted issues such as physical stress (throat hurting after singing) and the importance of the group you sing with and the skills of the musical director. How the choir manage poor performance and lack of confidence is important in contributing to wellbeing and health benefits. A non-judgemental

experience with help, support and friendship was noted as important by many participants.

Wellbeing benefits were also noted in the role of many choirs in supporting the community through singing for charities, supporting the socially isolated and marginalised to begin to feel part of their community – enabling people from all walks of life to share in the benefits of singing as a group. A supportive network was important with a sense of choir members looking after each other. In short, many factors about being in a choir were as important as the actual singing, such as finding new friends and supporting each other in times of sorrow and joy. A previous study of singing for people with post stroke aphasia indicated two primary benefits of group singing: developing a sense of belonging and creating the conditions for engagement. The establishment of positive and meaningful psychological connections with other group members may be where the health benefit arises from choral singing.⁴⁷

Given the exploratory nature of this research, it is acknowledged that definitive conclusions should be drawn with caution. Nevertheless, this article provides the largest sample to date exploring singers' perceptions of the health and wellbeing benefits of singing. This study concurs with previous studies recommending future research to include both larger controlled and in-depth qualitative studies.⁴⁸

LIMITATIONS

The authors would like to acknowledge a number of limitations with this study. The 4-point Likert scale utilised to acquire responses could have been increased to a more expansive scale or include an option of 'Don't Know' or 'Unsure'. There was no systematic distribution of the survey and no opportunity to ensure quality of participants. In the survey, the terms professional or amateur were used without definition given. Finally, a significant limitation that must be addressed in all exploratory studies is participation bias, in that only those

attending choirs answered the survey, and it is likely that those who attend choirs find it beneficial. Future research could examine these same benefits with a control group of solo singers, and an additional control group of a different group activity that did not involve singing. Earlier researchers have clearly identified a need to isolate the mechanisms that may be uniquely at work in the process of choral singing that would be distinctly separate to other social/leisure activities.

CONCLUSION

This study is important, not only as it represents the largest of its kind, in exploring singers' perceptions of the potential health benefits of singing in a choir, but because it is a study of healthy choristers who confirm the findings of many smaller studies with clinical populations. The findings highlight a number of interesting group differences that warrant further examination in future research. It is expected that this research will contribute significantly to the current literature in encouraging further spending and investment in community arts initiatives such as choral singing, to promote physical, social and emotional health of the general population.

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CONFLICT OF INTEREST

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

ETHICAL APPROVAL

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References [AQ: 4]

1. Beard R. Art therapies and dementia care: A systematic review. *Dementia*. Available online at: <http://dem.sagepub.com/content/early/2011/09/14/1471301211421090> (2011, Last accessed 10th October 2012).
2. Golden A, Gammonley D, Hanna Powell G *et al*. The challenges of developing a participatory arts intervention for caregivers of persons with dementia. *Cureus* 2017; 9(4): e1154.
3. Hammar L, Gotell E, Engstrom G. Singing while caring for persons with dementia. *Arts and Health* 2011; 3(1): 39–50.
4. van der Steen JT, van Soest-Poortvliet MC, van der Wouden JC *et al*. Music-based therapeutic interventions for people with dementia. *Cochrane Database of Systematic Reviews* 2017; 5: CD003477.
5. Vink Annemiek C, Birks J, Bruinsma Manon S *et al*. Music therapy for people with dementia. *Cochrane Database of Systematic Reviews* 2003; 4. Available online at: <http://www.mrw.interscience.wiley.com/cochrane/clsystrev/articles/CD003477/frame.html>
6. Lewis A, Cave P, Stern M *et al*. Singing for lung health – A systematic review of the literature and consensus statement. *NPJ Primary Care Respiratory Medicine* 2016; 26: 16080.
7. McNaughton A, Weatherall M, Williams M *et al*. Sing your lungs out – A community singing group for chronic obstructive pulmonary disease: A 1-year pilot study. *BMJ Open* 2017; 7(1): e014151.
8. Goldenberg RB. Singing lessons for respiratory health: A literature review. *Journal of Voice*. Epub ahead of print 28 April 2017. DOI: 10.1016/j.jvoice.2017.03.021.
9. Irons JY, Kenny DT, Chang AB. Singing for children and adults with bronchiectasis. *Cochrane Database of Systematic Reviews* 2010; 2. Available online at: <http://www.mrw.interscience.wiley.com/cochrane/clsystrev/articles/CD007729/frame.html>
10. Irons JY, Kenny DT, Chang AB. Singing for children and adults with cystic fibrosis. *Cochrane Database of Systematic Reviews* 2010; 5. Available online at: <http://www.mrw.interscience.wiley.com/cochrane/clsystrev/articles/CD008036/frame.html>
11. Bradt J, Dileo C, Grocke D *et al*. Music interventions for improving psychological and physical outcomes in cancer patients (review). *Cochrane Database of Systematic Reviews* 2011; 9: CD006911.
12. Daykin N, Bunt L, McClean S. Music and healing in cancer care: A survey of supportive care providers. *The Arts in Psychotherapy* 2006; 33: 402–13.
13. Fancourt D, Williamon A, Carvalho L *et al*. Singing modulates mood, stress, cortisol, cytokine and neuropeptide activity in cancer patients and carers. *ecancermedicalscience* 2016; 10: 631.
14. Reagon C, Gale N, Dow R *et al*. Choir singing and health status in people affected by cancer. *European Journal of Cancer Care* 2016; 26: e12568.
15. Rykov MH. Music at a time like this: Music therapy cancer support groups. *Dissertation Abstracts International, Section A: Humanities and Social Sciences* 2007; 68(1–A): 49.
16. Mansens D, Deeg DJH, Comijs HC. The association between singing and/or playing a musical instrument and cognitive functions in older adults. *Aging & Mental Health*. Epub ahead of print 19 May 2017. DOI: 10.1080/13607863.2017.1328481.
17. Fancourt D, Perkins R. Associations between singing to babies and symptoms of postnatal depression, wellbeing, self-esteem and mother-infant bond. *Public Health* 2017; 145: 149–52.
18. Persico G, Antolini L, Vergani P *et al*. Maternal singing of lullabies during pregnancy and after birth: Effects on mother-infant bonding and on newborns' behaviour. *Concurrent Cohort Study. Women and Birth* 2017; 30(4): e214–20.
19. Clift S, Hancox G. The perceived benefits of singing: Findings from preliminary surveys of a university college choral society. *The Journal of the Royal Society for the Promotion of Health* 2001; 121(4): 248–56.
20. Clift S, Page S, Daykin N *et al*. The perceived effects of singing on the health and well-being of wives and partners of members of the British Armed Forces: A cross-sectional survey. *Public Health* 2016; 1(8): 93–100.
21. Vella-Burrows T, Bamford A. *Choir of the Year Competition 2014: An evaluation of well-being effects*. Canterbury: Sydney de Haan Research Centre for Arts and Health, Canterbury Christ Church University, 2015.
22. Clift S, Hancox G, Morrison I *et al*. *Choral singing, well-being and health: Summary of findings from a cross-national study*. Canterbury: Canterbury Christ Church University, 2008.
23. Clift S, Hancox G, Staricoff R *et al*. *Health: A systematic mapping and review of non-clinical studies*. Canterbury: Canterbury Christ Church University, 2008.
24. Mannion R. *National HR Report November & December 2016*. Available online at: <https://www.hseland.ie/leadership/Portals/leadership/content/November%20%27%20December%202016.pdf> [AQ: 5]
25. Welch GF, Himonides E, Saunders J *et al*. Singing and social inclusion. *Frontiers in Psychology* 2014; 5: 803.
26. Tavormina MG, Tavormina R, Nemoianni E. The singing-group: A new therapeutic rehabilitation for mood disorders. *Psychiatry Danubina* 2014; 26(Suppl. 1): 173–7.
27. Coulton S, Clift S, Skingley A *et al*. Effectiveness and cost-effectiveness of community singing on mental health-related quality of life of older people: Randomised controlled trial. *The British Journal of Psychiatry* 2015; 207(3): 250–5.
28. Sun J, Buys N. Effects of community singing program on mental health outcomes of Australian Aboriginal and Torres Strait Islander People: A meditative approach. *American Journal of Health Promotion* 2016; 30(4): 259–63.
29. Creech A, Varvarigou M, Hallam S *et al*. Scaffolding, organizational structure and interpersonal interaction in musical activities with older people. *Psychology of Music* 2014; 42(3): 430–47.
30. Maguire LE, Wanschura PB, Battaglia MM *et al*. Participation in active singing leads to cognitive improvements in individuals with dementia. *Journal of the American Geriatrics Society* 2015; 63(4): 815–6.
31. Svansdottir HB, Snaedal J. Music therapy in moderate and severe dementia of Alzheimer's type: A case-control study. *International Psychogeriatrics* 2006; 18(4): 613–21.
32. Clift S, Nicol J, Raisbeck M *et al*. Group singing, wellbeing and health: A systematic mapping of research evidence. *UNESCO Observatory* 2010; 2(1): 1–25.
33. Kirsh ER, Van Leer E, Phero HJ *et al*. Factors associated with singers' perceptions of choral singing well-being. *Journal of Voice* 2013; 27(6): 786.e25–32.
34. Clift S, Hancox G, Morrison I *et al*. Choral singing and psychological wellbeing: Quantitative and qualitative findings from English choirs in a cross-national survey. *Journal of Applied Arts & Health* 2010; 1(1): 19–34.
35. Hopper MJ, Curtis S, Hodge S *et al*. A qualitative study exploring the effects of attending a community pain service choir on wellbeing in people who experience chronic pain. *British Journal of Pain* 2016; 10(3): 124–34.
36. Osman SE, Tischler V, Schneider J. 'Singing for the Brain': A qualitative study exploring the health and well-being benefits of singing for people with dementia and their carers. *Dementia* 2016; 15(6): 1326–39.
37. Abell RV, Baird AD, Chalmers KA. Group singing and health-related quality of life in Parkinson's disease. *Health Psychology* 2017; 36(1): 55–64.
38. Bailey B, Davidson J. Adaptive characteristics of group singing: Perceptions from members of a choir for homeless men. *Musicae Scientiae* 2002; 6(2): 221–56.
39. Bailey B, Davidson J. Effects of group singing and performance for marginalized and middle-class singers. *Psychology of Music* 2005; 33(3): 269–303.
40. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology* 2006; 3(2): 77–101.
41. Densin N, Lincoln Y. *The Sage handbook of qualitative research*, 3rd edn. Thousand Oaks, CA: Sage, 2005.
42. Pearce E, Launay J, Machin A *et al*. Is group singing special? Health, well-being and social bonds in community-based adult education classes. *Journal of Community & Applied Social Psychology* 2016; 26(6): 518–33.
43. Lally E. 'The power to heal us with a smile and a song': Senior wellbeing, music-based participatory arts and the value of qualitative evidence. *Journal of Arts & Communities* 2009; 1(1): 25–44.
44. Hays T, Minichiello V. The meaning of music in the lives of older people: A qualitative study. *Psychology of Music* 2005; 33(4): 437–51.
45. Bygren L, Johansson S, Konlaan B *et al*. Attending cultural events and cancer mortality: A Swedish cohort study. *Arts and Health* 2009; 1(1): 64–73.
46. Cuypers K, Krockstad S, Holmen TL *et al*. Patterns of receptive and creative cultural activities and their association with perceived health, anxiety, depression and satisfaction with life among adults: The HUNT study, Norway. *Journal of Epidemiology and Community Health*. Epub ahead of print 2012; 66: 698–703.
47. Tarrant M, Warmoth K, Code C *et al*. Creating psychological connections between intervention recipients: Development and focus group evaluation of a group singing session for people with aphasia. *BMJ Open* 2016; 6(2): e009652.
48. Reagon C, Gale N, Enright S *et al*. A mixed-method systematic review to investigate the effect of group singing on health related quality of life. *Complementary Therapies in Medicine* 2016; 27: 1–11.

APPENDIX 1

Breakdown of sample by country		
	Frequency	Percentage
Ireland	967	54.4
Australia	159	8.9
UK	490	27.5
USA	55	3.1
Spain	3	0.2
Bosnia and Herzegovina	12	0.7
Canada	5	0.3
New Zealand	39	2.2
Croatia	4	0.2
France	3	0.2
Qatar	2	0.1
Denmark	1	0.1
Germany	6	0.3
Netherlands	5	0.3
Serbia	10	0.6
Singapore	3	0.2
South Africa	1	0.1
Finland	1	0.1
Sweden	1	0.1
Missing	12	0.7
Total	1,779	100